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CONSOLIDATED VULTEE AIRCRAFT CORPORATION
San Diego, California

Memo To: Those Concerned

Subject: Model XP5Y-1 Accident Discussion

Enclosure: (A) Crew Statements
(B) Discussion

The following information is a complete transcription of the flight crew comments obtained during a discussion period in Mr. F. W. Fink's office at 9:00 A.M. this date. For assistance in understanding the statements the flight crew consisted of:

Name	Classification	Crew Station
D. P. Germeraad	Engineering Test Pilot	Pilot
W. J. Martin	Chief Test Pilot	Co-Pilot
R. G. McGeary	First Flight Engineer	First Flight Engineer
W. J. Belliston	First Flight Engineer	Second Flight Engineer
V. L. Allwardt	Sr. Flight Test Engineer	Aerodynamic Data Panel
E. H. Davies	Sr. Flight Test Engineer	Temperature & Engine Vibration Panel
L. C. Bennett	Flight Test Engineer	Power Plant Data Panel
F. L. Cook	Research Test Engineer	Oscillograph Station
R. E. Sassman	Test Engineer B	Brush Recorder Station
C. E. Richbourg	Engineering Test Pilot	XF2Y-1 Chase Plane Pilot

The crew statements appear in the order interviewed and the question and answer discussion following the crew statements is also included.

W. W. Fox
W. W. Fox
Asst. Chief of Experimental Flight

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DOD Dir 5200.9 11-26-58
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Germeraad:

I made one run at 330 mph which was a repeat run from a previous flight. We wanted to check it and see that everything was O.K. at a previous condition tested before proceeding to a higher speed. Is Fran here yet? Fran then reported at 330 mph that we had sufficient dampening to proceed on to the next speed which was 340. We climbed back to altitude and started the run. This was done on six power sections. We had one power section out on #1 and one on #4 giving us balanced power across the board on six power sections. Accelerated to 340 mph very cautiously. We were at 340 trimming out and I estimated that in about 10 to 15 seconds, I could feel a slight tremor in the control column, low amplitude sustained frequency. I would estimate to be between 10 to 15 cps. Immediately feeling that, I reached up to reduce power and at the same time we had the same control movement that we had on a previous flight at 302, in other words, this undampened oscillation of the tab. At the same time, I remember Davies reported that his elevator control tab instrumentation went wild. With Martin's help we were able to reduce airspeed to 170 and climb for altitude and we leveled out approximately 9,000 feet. At that time I had McGeary and Martin go back to the rear end of the aircraft. I knew that our elevator control tab had let go. McGeary and Martin, made a complete check on the damage at the tail area. The damage warranted immediate notification to the ground station and alerting all Air Sea Rescue Units to stand by. I had McGeary replace Belliston at the Flight Engineer Station, Allwardt replacing Lloyd Bennett at Panel A, Bud Davies was still on station, and all other crew members were to take "bail out" positions. At this time, I had planned, knowing the damage on the airplane, to ask McGeary to volunteer and we would try to bring the airplane in having all the other crew members bail out and McGeary would be on a voluntary basis and stay with it if he liked. To check the airplane at altitude we had everyone still on board. As you know one elevator was useless and the control tab was useless and the control forces were high. I felt if we could maintain sufficient control using power and using the control tab that is your manual tab, I felt I could possibly make an open water or sea landing away from the facilities around San Diego but at least I could save the airplane in the open sea. However, making check with partial flaps and with power something again gave in the tail; that is, in the elevator section. I do not know what it may have been a free floating elevator or the elevator took a new position and with the resulting control force we did not have sufficient control for both Martin and I to bring the airplane out of an uncontrolled dive. At that time there was nothing left for us to do but abandon ship and I want to thank the crew for a very orderly manner in which they left the airplane. I think they did a grand job and I stayed with it knowing they had trouble with their rear hatch, and I was fighting with the controls. I did not know at what time they would get free of the airplane. And I had some partial control, I estimate it between 5 and 10 percent and the rest of the control was inherent on the airplane static longitudinal stability. In other words, it was a divergent oscillation of which I had probably 5 to 10 percent control. I could dampen the oscillation but it was still divergent. I couldn't do any more than to lessen its divergent nature. By so doing I hoped to give the crew more time to bail out and at the same time I still had lateral control to make a slight left turn to take it away from a possible turn toward the oceanside area. After ascertaining that all the crew had bailed out of the airplane, I followed.

[redacted]

Fox: How about doors and windows that you tried to open?

Germeraad: Due to the acceleration I could not open the side window but part of that was due to the fact that I had yawed the airplane slightly to get into a slight left turn away from the oceanside area and the fact that the handle was in a forward position which meant that I had to apply enough force to bring the crank on around and release the mechanism to unwind the window.

Fox: Did all your personal gear function O.K.?

Germeraad: Very good and we have already gone over and congratulated Ada Nickerson on a job well done.

Fox: Do you have anything else to add, Don?

Germeraad: I think the Coast Guard and the Navy did a good job on Air Sea Rescue. It was really a grand performance all the way around.

Bill Martin:

Just to re-state what Don has already said on the power configuration, we had a power unit out on both outboard nacelles, we had completed a check at 330 where everything appeared to be much the same as it was on the previous flight and Fran Cook reported from his observations in the oscillograph trace that the dampening appeared to be satisfactory. We climbed back to altitude in the interim period and had just reached 340 mph and I think Germeraad's estimate of 10 or 15 seconds time is pretty good. I was leaning well over to the left trying to read the trim tab indicators and the first indication of trouble that I had was when Bud Davies came on the interphone with the statement to watch the elevator. Apparently that is when the instrumentation dial spun. I started to straighten up and about that time this first heavy oscillation occurred and Germeraad had already gotten power pulled back and I got on the control wheel to do what I could to help. By that time any motion appeared to have stopped. I did not get the trim tab reading actually. Things seemed to quiet down pretty well and then Germeraad shifted the crew around and had McGeary go back first to the tail to make a survey of the damage. McGeary reported what he had seen and Germeraad asked me to go back also and take a look at it. Would you like a statement of what we saw at this time?

Fox: Yes, tell us what you saw.

Bill Martin: The left hand elevator tab appeared to be distroted and bowed up rather sharply in the middle. You check me on this McGeary. The shroud plate skin area around the nose of the elevator; that is, the stabilizer skin was badly broken on the bottom side. I don't remember any on the top side. The elevator itself had some slight skin damage, not very much as I remember, then the elevator torque shaft had failed just outboard of the airplane structure line. The inboard end of the elevator was displaced up about, I would estimate, 2" and the elevator itself at this speed and power condition was riding very steadily. There was some slight tremor to it but it was not wandering. As far as we could ascertain there was no structural damage to the main structure of the stabilizer itself. The right hand elevator appeared to be in fairly good shape. Toward the outboard end there was

[redacted]

Bill Martin: (Continued)

some shroud plate skin distortion on the bottom side. I then went back forward to check the crew people at the aft station and everybody had their chutes on and were buckled up and went on forward and discussed the situation with Germeraad and I think that we mutually agreed that about the only thing to do was to see if we could get the airplane into a landing configuration of some sort and if it appeared feasible or practical then plan to try to get the airplane back. The crew all this time was alerted to bail out. During the period the flaps were going down then, at 20° flap everything appeared to be pretty steady still, the speed was slowing up very nicely and then at 30° flap the nose down motion occurred and Germeraad stated that he did not think he could hold it. I hesitated a few moments watching him and decided that he obviously couldn't, and his statement was at that time that we would have to bail out. My seat was full back at that time as I had just come back forward and I was sitting sidewise on it. I hollered to Belliston to open the side door and go ahead and I started down the steps then, after giving a warning on the radio that we were bailing out, I got to the bottom of the steps and thought about the inboard props and went back up and pushed the feathering buttons and Germeraad I think was there about the same time. I stood in the doorway until the prop had stopped turning and then I went ahead and bailed out and the crew followed behind me. I think Germeraad's statement that the Coast Guard are a wonderful group of people is exactly right.

Fox: Did you have any difficulties with your personal gear?

Martin: No difficulty at all, the parachute gave me quite a yank but that is fairly normal. The Mae West opened very satisfactorily and the sea marker dye is very penetrating.

Fox: Mac would you care to give us what you heard, saw, and felt?

McGeary: At the time that the trouble occurred, I checked on the engines, not knowing what had happened, and everything as far as engines were concerned was operating normally and continued to operate normally after Germeraad had pulled them back to the idle position. When Don ordered me to go back to the tail, I proceeded to the tail and can only verify what Bill Martin has outlined on the damage. I would like to add that the tab he mentioned was the flight tab and not the trim tab that was bowed and I noted that the center hinge bracket was completely disconnected and the outer two end brackets were the things that were holding that tab on the elevator. The shroud plate was damaged to a considerable extent on the left hand stabilizer whereas on the right hand side there was small damage to the shroud plate. The torque tube that was sheared was the main elevator torque tube and not the flight tab torque tube. That is about all except that I checked everybody's chute from the rear and came forward and changed stations with Belliston and stood by to do what was necessary with the engines and when Germeraad gave the word to bail out I followed Belliston who was immediately after Martin. All my gear worked normally, outside of making the mistake of opening my chute at too high a speed which jerked me pretty heavily, everything worked swell.

[redacted]

Fox: Walt, how about your statement?

Belliston: At the time of the trouble I was at the flight engineer's panel and I felt a vibration something like when you are in a stall and I noticed the throttles coming back immediately and the vibration ceased then and everything seemed normal as far as the airplane was concerned. The engines were operating normally. Then Germeraad asked McGeary to go back and take a look at the tail. He did and told about it. Martin went back and then when they got forward Germeraad had McGeary take my place at the panel and I got over to the door. I had already, checked my chute as soon as I got out of the seat, I checked to make sure the door was open allright. I did not know anything about the trouble in the back of the airplane. I assumed that they were in good shape back there so when Germeraad gave the order to leave the airplane Martin said "Open the door" and I opened the door and I looked out and saw that the #2 propeller was feathered and #1 was just coming to a stop. Then Martin went out and I went out behind him. I think that I opened my chute a little soon. I hit my leg along the side of the fuselage. I knew that I had hit something and I didn't know whether it might have been serious enough for me to pass out so I just opened the chute then and figured that they could pick me up on the ground even if I was unconscious because the planes had been alerted. I was in the water about one minute when they pulled me out. Everything worked fine. I had a few rips in my chute but it did not seem to effect it. Made a nice easy landing.

Fox: Lloyd, do you have anything to say?

Bennett: I do not have too much to add to what has already been told except that I was told to go back and stand by the double doors underneath the wing. We had the orders to bail out and we could not get the doors open. It appeared to me that they were sprung at the top. The bottom was open about 6". We actually had sprung the door, 3 of us pulling on it, so then we knew we were doomed there and we had to find another exit and saw the boys going out the front. I don't know in what order but we all proceeded to follow. I fell down on the way but it did not take me long to get up. After I jumped out I made sure that I was clear of the airplane and also tried to stop my gyrating so I guess I made a free fall of about 4,000 feet. Everything else seemed to be normal. I was in the water about 20 minutes. Picked up by ______________.

Allwardt: I agree on the speed of 340 that Germeraad has quoted, when he called 340 from his indicator my instrumont on the test panel which is in the same speed indicator system read 340 mph. I also agree independently that it was 10 seconds at that speed before the elevator control tab indicator began to spin. Davies can perhaps elaborate on our test instrumentation which tells the frequency at which this can occur. After the flutter stopped, the airplane seemed quite steady up until the time that I left the airplane and also no severe accelerations or vibrations. During the dummy landing attempt I was watching the wing flap indicator and it was put down in small increments, 10, 20 and 30° wing flap and as I saw it the minimum speed that we got to just prior to the statement from Germeraad that he could not hold it, the minimum speed was 130 mph. The elevator instrumentation I believe was connected to the left hand elevator and was failed so we had no further indication of elevator position. When the word came to bail out, I chose to go to

[redacted]

Allwardt: (Continued)

the rear hatch and as I got back even with the manometer board station, I could see the hatch being tugged on by 3 or 4 people. It looked as though the top pin had failed to come out of the upper jam as the doors are held in three ways, in the jam at the top of the door, at the bottom of the door, and into the front door. It looked as though the top pin had not released, was hung up, and I turned and made my way very easily to the front door and rolled out of the airplane with my left side against the edge of the hatch. Parachute worked fine. My Mae West worked fine - dye marker worked. I had a momentary scare from the parachute but fortunately it was blowing away from me and I think that my arms were over my head when I finally got out of the parachute in the water. Everything was loose. I think most of us had everything loose when we landed, that is all that I have to say.

Davies: As we approached the 340 speed I watched the panel B instrumentation. I agree in the speed. We were at 340 for approximately 10 seconds. As we got even with 340 speed I paid particular attention to the elevator and elevator tab instrumentation which has a characteristic oscillation which is not harmonic but has been seen on all of our previous flights at the higher speeds. However, this instrumentation is primarily designed for steady conditions and becomes resonant at around 10 cycles which was one of the reasons why we were relying on oscillographic data for that information because of the resonance of the instrumentation. As I watched the elevator flight tab position indicator the oscillation became greater and the instrument spun which indicates that it had reached a resonant point. At about the same time that I shouted on the interphone to watch the elevator, a severe shudder went through the airplane which I presume is the control reaction that Germeraad had. After that the elevator and flight tab instrumentation was inoperative. The elevator position indicator remained at about 5° up but I do not think it is of any value and the tab position indicated about 2 or 3° up. There again I also think that it is an invalid reading because the equipment obviously had failed. When Germeraad gave the order for everyone to prepare to bail out except for minimum stations of McGeary, Allwardt, and myself, I tightened my parachute straps and stayed on station until he gave the order for all of us to bail out following the simulated landing attempt. When the order to bail out came, I followed Allwardt to the aft hatch. I actually reached the aft hatch, I did not know that Allwardt turned around and went forward about that time but thought that he went further back. I think he actually got up to it also just about the time that I got there and realized that the top pin of the door was stuck and all the boys were tugging on it with no success. Someone reached the decision to use the forward hatch and the entire bunch of us paraded up the aisle to the forward entrance. I was immediately behind Bennett. He stumbled in the aisle. I gave him a shove enroute and we all went out in a more or less orderly manner. I think that I made the same mistake that everybody else made, I opened my chute too soon. I got a pretty good jolt. I do know, however, that I was clear of the airplane because as I went out I saw the airplane flying away from me. I got a view of the empennage. I could not find my ring for what seemed like a long time but apparently it was just a few seconds. All my personal gear worked satisfactorily. The drop into the water was much easier than I expected. I was completely out of my harness at the time I touched the water. As soon as my feet hit I slid out. I held on to my chute

[redacted]

Davies: (Continued)

for some time after making sure that I was not going to come up in the shroud lines. I was going to attempt to sail into shore. However, the breeze was not sufficient to maintain the chute and I abandoned it. I was only in the water a couple of minutes when a helicopter picked me up, lowered a chair (very easy to get into). They pulled me aboard. They already had Allwardt and Belliston onboard. We then went over to Fran Cook who was in the water. Apparently the helicopter had its full load because we made no attempt to pull hom out but we did dump a raft over to him. The helicopter deposited the three of us at the Point Loma Light House and went back to pick up additional survivors. That is about all I have to say.

Fox: Sassman, your statement please.

Sassman: I was on the oscillograph handling brush recordings in conjunction with Fran Cook. At the speed of 330, I took a Brush record of the trim condition and was unable to record the dynamic control or the control stick bang because the Brush did not operate. The stick was banged. The trim records indicated that everything was allright. It was my personal observation that it was a little rougher back there then on the previous trip when we hit 330. When we hit 340, the entire aft section of the ship vibrated violently and I was just reaching over to pull the Brush recorder switch and I was forced to the floor. I had my safety belt on, I was doubled over, and came back up. Of course, Germeraad asked McGeary and Martin to survey the damage and I stood by the aft hatch with Bennett and Cook and when Germeraad gave the order to bail out the three of us, Cook, Bennett and myself, attempted to open that door without too much success. I turned around and saw Allwardt coming aft, I did not notice Davies, but it seemed to me that he got about half way to the rear and sized up the situation and went forward. I knew that this was time for us to leave too and I hit Cook on the shoulder and shouted "forward" and went forward myself and followed Allwardt out of the front. I pulled my chute too soon. Got quite a severe jolt but it functioned properly. The Mae West functioned properly. Coast Guard I thought, were very efficient. I was in the water about 10 minutes. I would like to add that I think that Germeraad did a marvelous job. I think we owe him a vote of thanks in the way he handled the situation.

Fox: Rich, may we have your statement.

Richbourg: The first call that I heard from the P5Y was while I was taxiing out from the line at North Island trying to contact KMA8 for radio check. The first call I heard was that the P5Y had serious difficulties and that they were trying to determine the nature of the difficulties. I tried to take off as quickly as I could and when I became airborne I called the P5Y to ask if I could be of any assistance. The answer was that no assistance was needed at the time, however, I do not believe that the P5Y crew knew that Navy Jet 612 had a Convair pilot aboard. So I hurried over to the Ramp and circled waiting for the Model 2 to take off and it was having radio difficulty and we were unable to establish communications. While circling over the Ramp, I kept my eye on the P5Y and the

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Richbourg: (Continued)

first sign of extreme difficulty was the airplane in a shallow dive over Point Loma and parachutes were beginning to open so I left the Ramp immediately and headed toward the P5Y. I did not get a chance to count the number of parachutes. By the time I got to the airplane it was in rather violent longitudinal oscillations and we attempted to take some pictures. I did not want to get too close to the airplane. I saw the last parachute come out at about 3,000 feet. We followed the airplane until it finally hit the water and went back to the last parachute and circled around it a couple of times and made one circle around the other parachutes. We saw I believe the last chute coming down even after the airplane had hit the water and after Germeraad had hit the water. Then we went back to where Germeraad was in the water. We saw the Beechcraft circling around and they had dropped a raft which was about 100 yards away from Germeraad. We saw his parachute and we finally saw Germeraad swimming in the water about 20 or 30 feet from his chute. We stayed near him until the Coast Guard plane was overhead and had spotted him and then we returned to North Island.

Fox: May we have your statement Fran.

Fran Cook: Germeraad it will apparently be easier for me to have you lead me off on this because you know what has gone on before in the testimony specifically what part of the operation you want to have covered.

Germeraad: Will you account your report of the 330 mph records.

Cook: The record at 330 was observation of the oscillograph screen exactly as it had been in the previous flight and the dampening appeared slightly better than in the previous flight at 330 mph. On our last run my main job of course is to follow these traces and to keep them centered so that the Brush recorder will catch the record when the time comes so up until the time you were very close to 340, I was not watching the screen but I was trying to keep the traces centered so that Sassaman could get his record as soon as you howlered "read". Just before you howlered 340, I looked back at the screen on the oscillograph and the amplitudes had risen to blurrs on the tail surfaces. I could not accurately evaluate it and I was just about to inform you of this when you notified the crew that you were in trouble and, of course, your interphone overrode mine. I could not say anything. I believe you knew you were in trouble before I knew you were in trouble because of the stick motion.

Germeraad: That is right. Will you give your experience up until the time you were picked up.

Cook: We were notified by the Flight Captain to prepare for bail-out and Sassaman and myself were already at that point. Two other crew members came back and to the aft bail-out station. I don't believe that both remained, I believe that Bennett was the only one that remained with us at that station. Cannot remember for sure. We remained there while the pilot and co-pilot attempted a high level simulated landing approach to determine whether or not the controllability of the

Cook: (Continued)

airplane would be satisfactory for a landing. We remained there while McGeary and Martin made their inspection of the tail. Of course, I heard that over the interphone system. Believe it has been previously reported on.

The plan as presented to the crew was even if the airplane had to land in this configuration, it would be with a minimum crew, I believe possibly Pilot, Co-pilot and McGeary so we were prepared, cinched up our parachutes even tighter and McGeary made an inspection of the parachutes at this time, also inspected the pins. We had also previously done this before taking off. It is a standard procedure with us. At the attempted landing at high altitude the word came over the interphone from the Flight Captain - "I cannot hold it - lets get out of it". The crew immediately reacted to this and the people in the front end proceeded out in an orderly fashion. The three people in the back end attempted to open the aft hatch. We could get the handle down but the top fitting did not release. The top pin did not come lose. With all three of us pulling on the door, we distorted it about 6 or 8" out and could not get it any further. After relatively few seconds of this we decided not to bother further with this. We went forward. I believe I was the seventh man out. Realizing that I was ahead of the propeller, I did not attempt to jump out away from the aircraft which probably accounts for the bruises on my left side. I tried to get down and came toward the lower left corner of the door. We got out very easily. Did not notice anything unusual and opened my chute. I was coming down head first at the time. Had no snap action at all, just a terrific amount of g's. The rest of it is conventional chute descent.

At this time I could only count seven chutes. I was followed out by Bennett who fell several thousand feet before he opened his chute. I believe it was the first one down. I did not see the airplane go out of sight. I did not see the pilot bail out nor did I see the airplane crash. I heard an explosion or something that sounded like an explosion about that time. Landing on the water my leg straps were so tight that I could not pull myself back into the cradle on the chute and so at the time of hitting in the water I only had my chest snap undone with a sufficient breeze to tow me in the water so that I could get the leg straps lose. I got out of my chute, inflated my Mae West, put out my marker dye. A fishing boat came by about 25 feet from me and asked if I was allright. I said that I was, so they went on. I presume they were going on to see if everyone else was allright. The Coast Guard helicopter came over with, I guess it had a full load to see if I was allright. I waved to them and gave them the O.K. sign. They pointed behind them and went on. A little later a second helicopter came by and dumped out a portable life raft which I climbed into with great effort. I think it was the greatest effort I experienced, getting into the life raft. I was then picked up by the small boat from the USS Gladiator. They went around retrieving equipment. They even saw, I believe, a smoke bomb which they did not retrieve. They got the boat and me and I am not sure what happened to the chute. I never saw the chute again. I was brought aboard the USS Gladiator, taken to the ward room, stripped to my skin, wrapped in blankets and put flat on my back. I was offered brandy, hot broth, and coffee. Took one swig of brandy and could not stand it. Had a sip or two of water and that is all I had. I had been aboard that ship for about five or ten minutes when the Coast Guard auxiliary Chriscraft, I believe, pulled along side and asked to have me transferred but I

[redacted]

Cook: (Continued)

got out on the deck ready to transfer but the water was too rough. They could not make the transfer at this point so I was sent back, put flat on my back again. At this time they wanted a report from me on the ship so I gave them all the names of the crew members aboard the airplane, identified it as the XP5Y-1 and said nothing about the airplane at all except that I believe I did admit that we had had trouble with the hatch. Other than that I said nothing about the experience. I was very well treated, given scivy shirt and shorts, and blanket (no feather). Finally after we entered the harbor I was transferred to the Chriscraft, and brought to the Coast Guard station. Bennett was also aboard this motor launch and we were both in pretty fair shape.

I did have some shock aboard the USS Gladiator. I think I had reasonably recovered from that before the transfer. As far as reaction to the experience, I got a fever of 101.3, sore throat, and sore ear. These things have gone away and I presume it was just a part of the nervous experience. I am going to have my own Doctor go over me well today because he gave me some antibiotics last night in case I did pick up an infection. Also I am quite sore. I have all my faculties.

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DISCUSSION

FOX: I think that going through the conversation that I heard yesterday, at the time the left hand propellers were feathered, were all engines feathered in the airplane or just the two on the left hand side.

GERMERAAD: To bring that point up a little bit more clearly, on this landing configuration, to elaborate further, when I saw that I could not hold it in this uncontrolled dive, I brought the flaps back to a 0° and tried with power and with the use of the controllable trim tab to obtain control of the airplane again but in this I was unable to do so, and when the "command" bail-out was given, simultaneous feathering of the propellers within a second or two. You step down, you step back, and we feathered almost simultaneously.

MARTIN: I pushed the two inboard buttons, I think, there were two hands there right about the same time.

GERMERAAD: In other words, all propellers were feathered before anyone left the airplane.

FOX: The other question was, I don't remember hearing anyone state, Bill or Mac, about the right hand spring tab. It seemed to me that I remembered one of you saying yesterday afternoon that this was missing from the airplane when you went back and looked out the back window. Is that correct or not?

MCGEARY: That is not correct. The right hand tab and elevator, matter of fact, both tabs and the elevator looked to be in excellent condition including the torque tube. The damage on the right hand side which was evident to us when we looked out the window was the bottom shroud plate, about 2/3 of the way out, was pulled down torn metal, you could not exactly determine how it was torn down but it was torn metal at that point. This was the only damage I could ascertain on the right hand side.

FOX: On the left hand side, the tab was there but the center hinge looked gone and the tab was bowed.

FOX: Davis asked a question about the trailing edge of the tab and elevators. What kind of shape do you remember them being in?

MCGEARY: The trailing edges on all the surfaces looked very good. In other words, other than the fact that this left hand flight tab was bowed in the center, the trailing edges were not broken.

MARTIN: I agree that that is correct.

MCGEARY: I might add one thing, Bill mentioned it lightly, that the left hand elevator bottom surface showed signs of damage. There were scars all the way to the elevator - bowed up in - in other words, it was under some compression at that point, at that elevator.

FOX:

Would you say that this could have been from the shroud banging against the bottom side of the elevator. I mean that it looked to be in that rough relative position.

MCGEARY:

Yes, this is true but at the time we looked, the shroud plate was still back in its original position.

FOX:

It would have had to spring back.

MARTIN:

The elevator was roughly streamlined except the inboard end displaced up with a definite bow at the first hinge.

DAVIS:

Were there any marks on the stabilizer itself?

MCGEARY:

This is impossible to see from the windows that are available back there. We could see, looking parallel with the bottom surface, we could see the ragged metal hanging down but you couldn't look up under that surface as it turns away from you.

MARTIN:

I looked at the left hand side from the forward windows in the doorway and as much of it as I could see, I probably could see one half of the outboard portion, and I could see no damage or signs of damage in that area. That is pretty far away from us forward, but as far as we could ascertain the stabilizer itself suffered no damage.

FOX: Ekrem, do you have any questions you might want verifying of?

EKREM:

I was just wondering about the torque tube whether you recall whether or not it was separated at the attachment to the elevator or away from the elevator?

MCGEARY:

The front tube was separated at the radius where it flanges out for the attachment to the elevator. It is a flanged attachment and it was failed right at that radius where the tube flares out to become a flange. The flange was still attached to the elevator. It was failed just at the flange fitting.

GREEN:

The flange fitting failed rather than the tube itself.

MCGEARY:

This is true. It was metal about that thick - 1/4".

EKREM:
There were no rivets or bolts. Did that seem to be in tact.

MCGEARY:
There were no signs of sheared rivets. This was a metal failure. Strictly a metal failure, yes. No rivets.

FOX:
Sebold - do you have a question?

SEBOLD:
I was wondering if there was any indication of whether the damage to this fairing etc - extreme up or down elevator.

MARTIN:
It was the bottom side of the shroud plate that we could see so that would have been from an extreme up elevator position. The top side, cannot be seen well at all.

DAVIS:
Were the markings you saw on the elevator as though something had hit the elevator?

MCGEARY:
They were stripes in the direction of flight across the chord of the elevator in that direction.

DAVIS:
Was the shroud ahead of them still there?

MCGEARY:
Yes

GREEN:
Were these stripes spaced so that they might have been made by the shroud ribs, for instance?

MCGEARY:
I could not determine that there was any symmetric to the scribe marks or the wrinkles. Whatever you want to call them.

SEBOLD:
Did anyone notice the leading edge of the stabilizer?

MARTIN:
Only as I outlined before, the left hand side from the forward windows and as far as I could see, there was no evidence that anything had struck the

TORRANCE:
Did the scratches look like they were mechanical scratches or just kind of airload?

MCGEARY:
I would say that the latter was more correct. More than a compression affair than anything else.

MARTIN:
These stripes. Not paint scratches. That is the point. The paint was all aboard. The paint was not marked in the areas that Mac has indicated the stripe. I don't believe so, I believe what Mac saw, as I remember seeing it, looked more like to skin had bowed in through partial rib failures and he just had bows like this Yes.

FOX:

Mike, do you have any questions?

DUBLIN:
Was the oscillation in the back of the ship like the one in the 340 and did you have violent motion in the control column?

GERMERAAD:
Yes, approximately two complete oscillations.

DUBLIN:
Is there any way of establishing whether it was symmetrical or anti-symmetrical?

GERMERAAD:
I would say it was symmetrical.

DUBLIN:
You did not bang the control column at 340?

GERMERAAD: No

DUGGAN:
This longitudinal deformation in the surfaces of the elevator. Could that have been due to the failure of the torque tube. I mean, a working effect of the elevator was that kind of a rib failure, do you think. Could the torque tube have failed first and then that in turn through airloads caused the skin deformation that you saw.

GERMERAAD:
I feel the flight tab failed first, that is, by failing we had an undamped oscillation and when it reached resonant condition caused the major oscillation of the elevator and failed the elevator torque shaft at that time.

MARTIN:
I think that is probably correct.

BURSTEIN:
Could you tell whether the push rod itself was broken.

MCGEARY:
As far as the push rods inside the airplane, all the way to this torque shaft, that is all the push rods back there. I examined them all because I was concerned about the other elevator, they were in excellent condition. There was no damage at all to any of the push rods.

DUBLIN:
How far did you reduce speed after this oscillation started?

GERMERAAD:
From 340 to 170.

WAINWRIGHT:
Is it possible that the damage to the shroud might have been caused by some of the control torque tube push pull rods being broken and damaging the shroud?

FOX:
Your talking about the push pull rod between the torque tube and the tab itself?

WAINWRIGHT:
Yes, out in the surface.

MARTIN:
The torn skin area extended over in several places going outboard extended over various lengths but I would estimate the shortest area was something on the order of 6 or 8" across and it was not spaced at any regular interval; that we could see at the time. I was not thinking about that particularly and I don't believe that what Jimmie is thinking would have been the cause of the shroud plates being damaged.

SEBOLD:
Some one mentioned before that you had some indications of this on a previous flight. What changes had been made to remedy the situation.

GERMERAAD:
Extended the rudder shroud plates.

BURSTEIN:
Only rudder shroud plates not the elevator shroud plates.

GERMERAAD:
Not the elevator, rudder. Clean up the flow in that area.

MARTIN:
I think the point to clarify is the oscillation you encountered before at 302 was on the elevator or on the rudder.

GERMERAAD:
That was on the elevator and by increasing the length of our rudder shroud plates, we cleaned up the flow across the elevator tab.

FOX:
That was the significant change that had been made in the airplane and had quieted the tab motion that we had been measuring.

DAVIS:
Did you run into any actual tab flutter before in any of your tests?

GERMERAAD:
Just on this run at 302 prior to the rudder plate extension.

DAVIS:
Was it flutter or just unpitch vibration?

FOX:
This is hard to define as a forced motion or flutter.

DUBLIN:
Frank, at that time we didn't take an actual record. On the previous flight they took a record at 330 and the data showed positive dampening.

FOX:
I think that unless someone has additional pertinent questioning, we have one question here - could the shroud skin have pulled off. From the previous testimony we have heard, I don't remember anyone mentioning from what they could visibly see, there was no actual large chunks missing.

MCGEARY:
Nothing missing that we could see.

KELLOGG:
Was there a possibility that it could have torn loose from the attachment of that fairing skin, the shroud skin?

MCGEARY:
I cannot answer that.

FOX:
Do you have any question, Adolph?

BURSTEIN: Was there any rudder motion apparent at the same time?

GERMERAAD: No definitely not, nor on the aileron.